

# Courses 6 & 14 form a new joint major

## Program first of its kind in country

By Anshula Gandhi

NEWS EDITOR

Students can now declare a joint major in computer science and economics. The 6-14 major was approved in a faculty meeting May 17, and the major requirements appeared on the Course 6 department website in late May.

The major is the first joint computer science and economics major in the country, “as far as we know,” Constantinos Daskalakis, associate professor of electrical engineering and computer science, said in an interview with The Tech. “The first in the history of the universe, as far as we know,” David Autor, professor of economics, added, laughing.

“I think it’s important to say that we don’t want 14 majors who have taken a programming class. We want people...with depth in 6 and also with depth in 14,” Daskalakis said. According to Daskalakis, the fields are intrinsically bound together. Von Neumann, Daskalakis said, was the father of both game theory and the modern computer. The fields were connected, but then diverged.

However, the fields of economics and computer science are now reconnecting. Autor provided an ex-

ample of how better algorithms can improve high-school allocations. School programs have an options for students to rank which school they want to go to before an algorithm pairs them to a school. But, historically “the ranking systems are really naive,” Autor explains.

According to Autor, the current ranking systems lead to misrepresented preferences. “Let’s say I want to go to schools A,B,C,D. And I really want to go to A. But if I put A as my first choice and don’t get it, I get dropped on the list. So I get into school C or school D. So people behave strategically. They don’t rank school A first because they don’t want to risk ending up at school D. So they rank school B.”

This risk-minimization leads to situations where “nobody is expressing their actual preferences,” which in turn results in an inefficient allocation of resources. The allocation is inefficient because, at the end of the process, many people want to trade the schools they end up at, but trading schools isn’t feasible. Less naive algorithms, suggests Autor, could help reduce this inefficiency.

“Our sense, at least from the

6-14 Major, Page 3



PING XU—THE TECH

Gang Chen, the Carl Richard Soderberg Professor of Power Engineering and Department Head, presents the Department of Mechanical Engineering doctorate to Lingping Zeng.

# Nearly a year after turnaround announced, near-term future of Senior House is uncertain

## Admins, dodging specific questions, only guarantee E2 will house MIT students

By Karleigh Moore

NEWS EDITOR

Administrators have still not given word on who will be allowed to live in Senior House this fall. The chancellor declined to dispel rumors that current residents might not be able to return to the dorm.

Freshmen will be able to rank Senior House in this year’s hous-

ing lottery; their ranking, however, may be ultimately disregarded. If a freshman ranks Senior House, they will see a message warning them that first-year housing in Senior House “is still under consideration,” chancellor Cynthia Barnhart PhD ’88 wrote in an email to The Tech.

Freshmen were also able to rank Senior House in last year’s housing lottery, which was held prior to the

announcement last June that no freshmen would live in the dorm. MIT cited low graduation rates and concerns of illegal drug use in the dorm as reasons for the decision.

Senior House community members told The Tech that there are worries that some or all current residents might be prevented from returning to the dorm come fall.

Barnhart would not comment on whether these actions are being

considered. When asked to confirm whether Senior House would house the current residents, or at least MIT undergraduates, Barnhart only confirmed that Senior House would house “MIT students.”

Barnhart says she has consulted with Senior House student leadership about community involvement in this year’s housing process and

Senior House, Page 2

## IN SHORT

**Graduating seniors must check out** of MIT housing by June 10 at noon.

**The deadline to initiate pre-registration** for fall classes is June 19.

**Remember to submit CI-H/HW subject preferences** before June 19 during pre registration.

**Congratulations to the class of 2017!**

**Send news and tips to** [news@tech.mit.edu](mailto:news@tech.mit.edu).

# LIGO yet again detects gravitational waves that general relativity predicts

## Third-time success of LIGO experiment will open new frontiers

By Emma Bingham

EXECUTIVE EDITOR

LIGO observed gravitational waves for a third time Jan. 4, scientists announced at a press conference May 31. With the new detection, this field is moving from a “novelty” to a “new observational science” of gravitational waves, said LIGO Scientific Collaboration spokesperson David Shoemaker.

In a paper that has been accepted for publication in Physical Review

Letters, scientists discuss this third confirmed detection of the spacetime wiggles known as gravitational waves.

Just like in the first two observations, these wiggles resulted from the merger of two black holes. This observation has enabled scientists to refine their understanding of binary black hole systems, and it has contributed more evidence in favor of Einstein’s famous theory of general relativity.

Everything produces gravitational waves, but most things produce them at orders of magnitude much

too small for humans to detect with current scientific instruments. LIGO is one of the most precise scientific experiments ever devised, including cutting-edge technology for reducing noise, and it still can only detect one of the most violent, powerful collisions in the universe: the merger of black holes.

The observation and its results

The signal, which scientists detected Jan. 4, took several months

LIGO, Page 3

# Nelson: LGBT services should be above-ground

## Rainbow lounge set to move to duPont

By Karleigh Moore

NEWS EDITOR

LGBT Services and the Office of Multicultural Programs will move from Walker Memorial to the duPont Athletic Center in W31 this summer. The move is expected to be complete this fall.

The new location is intended to provide these two campus resources with larger spaces and bring them closer to the center of campus.

“I will definitely frequent the Rainbow Lounge more when it is

in duPont,” a rising junior wrote to The Tech. The student mentioned she loved the events put on by the Rainbow Lounge but found that she felt awkward that she was the only “non east campus kid there.”

“To make MIT more welcoming and inclusive, students who rely on OMP and LGBT Services for support and connection need to feel like they are in the midst of the community, not dispersed across campus or (literally) underground,” said Suzy Nelson, Dean for Student

Rainbow lounge, Page 3

## SENIOR GIFT LAGS BEHIND PAST YEARS

Boycott may have caused a drop in donations. **NEWS, p. 2**

## CAREER FAIR WOES

Monetary incentives skew career fair representation. **OPINION, p. 4**

## A SENIOR REFLECTS ON MIT

Education should involve scrutinizing our own beliefs. **OPINION, p. 5**



## TECH TRANSFERS

An Israeli professor’s journey to MIT. **CAMPUS LIFE, p. 6**

## HIGHER HEALTH COSTS EXPLAINED

Medical director defends increase in student premiums. **OPINION, p. 5**

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WEATHER

# Summer is coming

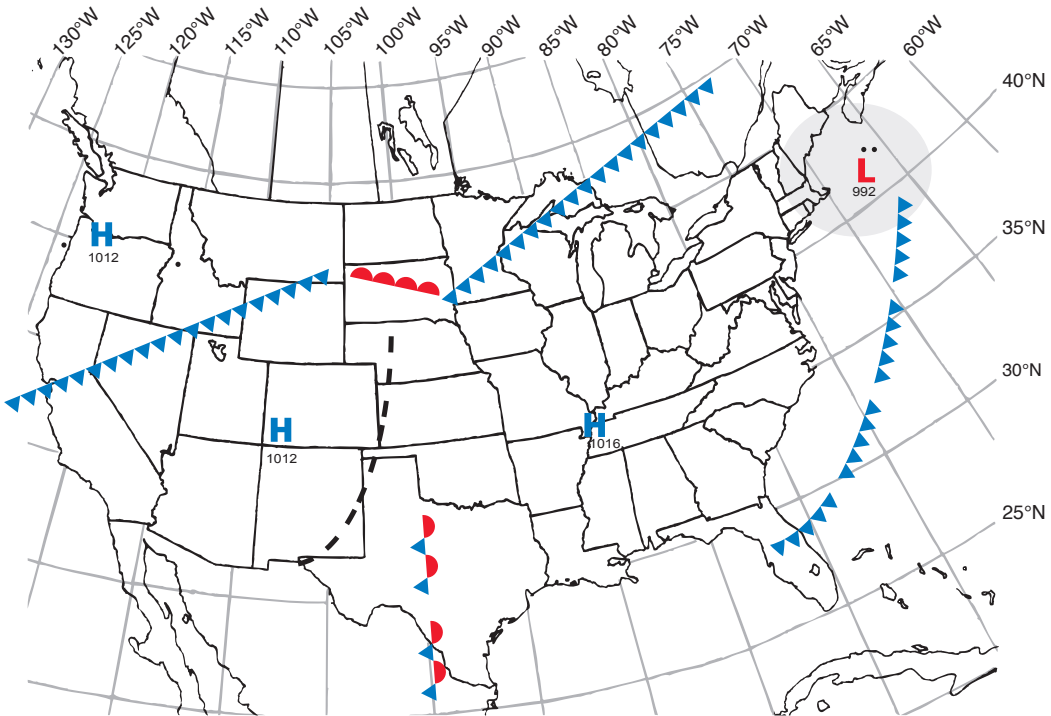
By Erik Lindgren  
STAFF METEOROLOGIST

After the record-breaking warm weather that the Boston area experienced in mid May we have had to deal with unusually cold temperatures up until Wednesday this week. In fact, Tuesday's high temperature of 52°F was tied (with 1926) as the lowest recorded high temperature on that day of the year since records began in 1872. Fortunately, this is about to change. High pressure has kept the sky mostly clear and the temperature relatively high during Wednesday and Thursday, but a low

pressure system moving NNE just off the coast may bring showers during Commencement. Thunderstorms are possible in the evening. However, after this system has passed the Boston area will once again experience high pressure and mostly sunny weather. The high temperature during the weekend and Monday will be in the 80 to 90°F range, and the winds will be relatively weak at 5 to 10 mph. The exception is Sunday, where we may experience wind gusts as strong as 25 mph. The weather is expected to stay warm and pleasant well into next week.

Extended Forecast

**Today:** Chance of showers, with thunderstorms possible late afternoon. High 71°F (22°C).  
**Tonight:** Chance of thunderstorms, then partly cloudy Low 58°F (14°C).  
**Tomorrow:** Mostly sunny. High 79°F (26°C).  
**Sunday:** Mostly sunny. High 90°F (32°C).  
**Monday:** Mostly sunny. High 86°F (30°C).



Situation for Noon Eastern Time, Friday, June 9, 2017

Weather Systems	Weather Fronts	Precipitation Symbols		Other Symbols
		Snow	Rain	
<b>H</b> High Pressure	--- Trough	⬆	⬇	☁ Fog
<b>L</b> Low Pressure	⬆⬆⬆ Warm Front	⬆	⬇	⚡ Thunderstorm
§ Hurricane	⬆⬆⬆ Cold Front	⬆	⬇	☁ Haze
	⬆⬆⬆ Stationary Front	⬆	⬇	
		Light *	Light *	
		Moderate **	Moderate **	
		Heavy ***	Heavy ***	

Compiled by MIT Meteorology Staff and The Tech

# Senior Gift loses ground

By Vivian Zhong  
EDITOR IN CHIEF

As of May 23, approximately 62 percent of the class of 2017 has donated to this year's Senior Gift Campaign. This is a significant drop from last year's 88 percent participation rate and a deviation from the steady increase the campaign has experienced since 2005. Earlier this year, members of the graduating class called for a boycott of Senior Gift in protest of administrative actions. The boycott drew both support and condemnation from fellow

students. Final results are not yet available. The campaign is still ongoing and will end later this month, according to Danielle V. Auriemma, Director of Student and Graduate Alumni Philanthropy at the MIT Alumni Association. As part of the campaign challenge, a group of New York-area alumni funds annual Mad Money Grants to support special projects for student groups. The gift incrementally scales with the participation rate, for a maximum of \$30,000 at 85 percent. The current level of participation would garner a gift of \$15,000.

# Residents express uncertainty about their housing next year

Senior House, from Page 1

that her office is “working directly with current residents to handle this matter as privately and responsibly” as possible. However, Barnhart did not describe any specific agreements or arrangements come to by students and administration. The Tech spoke with sev-

eral Senior House residents and potential transfers. None would speak on the record, but most expressed uncertainty and worry about the future of housing in the dorm. Senior House student leadership has not yet responded to request for comment. This May, administrators cancelled Steer Roast, an annual weekend-long music

event at Senior House, due to “dangerous behavior” in the dorm. Barnhart would not say what factors are being considered in any decisions about student housing in Senior House, and said that a timeline for a decision was announced to Senior House students. Vivian Zhong contributed reporting.



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SUSANNA OGATA, VIOLIN

GUSTAV MAHLER'S SYMPHONY NO. 1 IN D MAJOR  
GEORGE OGATA  
MUSIC DIRECTOR AND CONDUCTOR



# Faculty members predict a more diverse Course 6

6-14 Major, from Page 1

Course 14 side, is that we are a relatively small major...and we think that this is going to bring a lot of students in the department,” Autor said.

Not only does the department want to increase enrollment in Course 14 classes, according to Autor, but the number of Course 14 majors.

Autor points to the fact that many people enroll in Course 14 classes, but very few of those people

go on to major in it. Autor mentioned concerns that in a technical institute, economics doesn’t have the same status as fields like math or computer science. “I think a lot more MIT students would actually like economics if they viewed it as being on par with, you know, these other fields. And I think that this pairing will help people to see that.”

While Autor foresees the program increasing the number of Econ majors, Asu Ozdaglar, professor of electrical engineering and computer science, contends Course 6 has

the “complementary” problem “We’re not a small major,” Ozdaglar said.

Dean for Undergraduate Education Dennis M. Freeman PhD ’86 mentioned in a previous interview with The Tech that it was concerning there were so many people in Course 6. He mentioned that was the main reason the minor in 6 was added. But after the minor was introduced, even more freshmen enrolled in Course 6 as their major.

The Tech asked what trends the professors foresee in Course 6 en-

rollment after adding a new major. “I believe it’s going to be growing at the same rate it has been growing,” Daskalakis said.

“We expect some increase, but not an overwhelming increase,” Ozdaglar said. “That increase is already happening.”

“If...registration is reduced from other majors, I wouldn’t blame it on 6-14 per se. I’d just blame it on people flocking into Course 6,” added Daskalakis.

Autor believes a lot of people in 6-14 would already have been

Course 6, so this major addition would be “broadening, not narrowing.”

“We think students will come out of this with a broader toolset,” Autor said. “How does [computer science] apply to commence? How does it apply to policy? How does it apply to social allocation of scarce goods?”

Costis also mentioned that he expected the major to “diversify” the enrollment in Course 6.

“We don’t want one-sided students,” Ozdaglar said.

# Physicists hope LIGO will detect neutron stars after upgrades

LIGO, from Page 1

to analyze fully, hence the delay between detection and publication.

The black hole system that created the gravitational waves has a mass of around 50 times the mass of our sun — in between the masses of LIGO’s first and second confirmed observations, which were 62 and 21 solar masses. It’s also twice as far as the first two observations, at a distance of 3 billion light years.

The detectors have a false alarm rate of less than 1 in 70,000 years, meaning signals that look like gravitational waves but actually aren’t occur very infrequently.

It is not currently possible to pin down the location of the black holes (i.e. their position in the sky, the galaxy they are in, etc.), though having more LIGO observatories around the globe will help with this in future observations.

Scientists also noted there is not enough data now to know how the number of collisions correlates with distance. That information, if obtained, would tell us how often these collisions have happened at different

times throughout the history of the universe.

An important result from this detection has to do with how binary black hole systems form. There are two major theories. The first is that the stars are already paired up before they become black holes. The second is that the black holes form inside dense stellar clusters and then fall to the center of those clusters and pair up with each other.

In these binary systems, the black holes spin on their own axes as well as revolve around each other, much like the planets rotate and revolve in our solar system. If the black holes were already paired up when they were still stars, as in the first theory, they would have to spin in the same direction that they revolve. Scientists found this likely wasn’t the case for the binary black holes in this observation, lending support to the second theory.

About the observatories There are two Laser Interferometer Gravitational-Wave Observatories in the U.S., one at Livingston, Louisiana, and one at Hanford, Washington.

Each observatory is a giant inter-

ferometer. It has two long arms that stick out at right angles. A laser shines down the arms. When a gravitational wave comes through, one arm is stretched and one is squeezed, so when the laser reflects back the crests and troughs of the beams from each arm will no longer be aligned. So, when the right kind of wave signal is detected, that indicates the passing of a gravitational wave.

LIGO’s current observing run started last November and will end in August. Before this run, both the observatories received updates.

At Livingston, scientists focused on reducing noise at low frequencies, which entailed efforts to reduce scattered light. This is light that reflects off chambers and tubes inside the instrument and creates noise. Scientists had to examine the instrument to find out where the light was coming from and then take measures to block that light.

At Hanford, scientists focused on reducing noise at high frequencies by increasing the power of the laser. However, a power increase does not automatically guarantee a sensitivity increase. For example, the increased power caused the mirrors in the de-

vice to ring like little bells, and scientists had to work to suppress that noise. In the end, they did not gain as much sensitivity as they hoped, but they have more plans to implement after this observing round ends.

Before the next observing run starts in 2018, each observatory will receive the updates that the other one has already received.

Testing general relativity Using the new observation, LIGO scientists also tested Einstein’s theory of general relativity.

Dispersion is the concept that different wavelengths of a wave signal travel at different speeds through a medium. This is the phenomenon that causes light to split into a rainbow inside a prism.

In general relativity, gravitational waves are nondispersive. LIGO scientists compared the predictions of GR and the predictions of other theories of gravity in which gravitational waves could have different amounts of dispersion. The new data supported GR’s nondispersive waves.

They also performed “null tests” of GR, in which they test how far the data deviates from the theory’s predictions without comparing to

any other theories of gravity. None of these tests indicated a statistically significant departure from GR, according to the paper.

What’s next for LIGO? In the summer, LIGO is expected to be joined by Virgo, another gravitational wave observatory located in Italy. Adding Virgo’s observations to the mix will enable scientists to improve their estimate of the position of black hole collisions in the sky by one or two magnitudes.

By the mid-2020s, two more observatories will go online — one in Japan and one in India.

Scientists now estimate that one of these black hole collisions could be detected on the order of once a day to once a week.

In the future, scientists hope LIGO will be able to detect the mergers of not only black holes, but also neutron stars, especially after further updates to the detectors’ sensitivity.

According to the agreement LIGO has with the National Science Foundation, the organization that partially funds the research, after four confident detections, the LIGO team must start to share their data more publicly.

# LBGT lounge abandons basement

Rainbow lounge, from Page 1

Life in a Division of Student Life press release.

Indeed, the press release mentions that east side students “will miss the current location” in Walker Memorial. “We’re committed to maintaining a presence and serving as a resource to students on the east side of campus,” Abigail Francis, Director of LBGT Services said

in the release. “OMP-affiliated groups need to find space for their programs,” said La-Tarri Canty, Director of the OMP, in the statement. “Because we haven’t had dedicated space, students congregate outside my office in W20.”

The new OMP space in duPont will “definitely encourage more cohesiveness amongst the various cultural groups across campus,”

Tiera Guinn ’17 said in the release. Some groups affiliated with OMP such as the Black Students’ Union and the Latino Cultural Center will retain their existing spaces.

The OMP works with more than 70 active student groups and LBGT services is affiliated with 12 active groups.

Nafisa Syed contributed reporting.

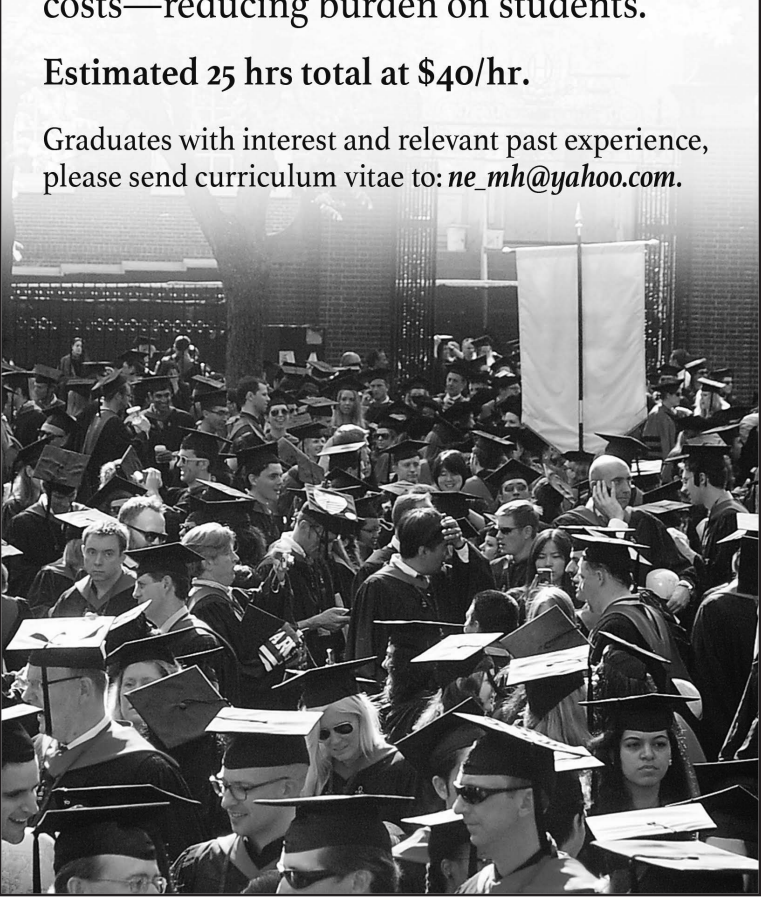
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**Solution to Hold ‘Em**  
*from page 9*

MARK		SCOT		CORD
EXURB		TIKI		ALOE
LEROI		PROM		MATE
BLACK	JACK	PLAYER		
ASL	IOTA	AIR		
	ANI	UNMOVED		
SAILING	SHIP	ERA		
WIDE	RON	PSIS		
ADO	ANALOG	WATCH		
BALONEY	AIL			
	RAW	FUSS	AAA	
THINGS	SWITH	HANDS		
YIPE	BART	ENJOY		
REAR	ONME	SNORE		
EDDY	YEAR	AUNT		

**Solution to Commencement**  
*from page 8*

6	4	5	3	2	8	1	9	7
1	8	9	7	6	3	5	4	2
3	1	2	9	8	5	7	6	4
7	5	6	4	3	9	2	1	8
4	2	3	1	9	6	8	7	5
5	3	4	2	1	7	9	8	6
8	6	7	5	4	1	3	2	9
2	9	1	8	7	4	6	5	3
9	7	8	6	5	2	4	3	1

**Solution to Bexley Hall**  
*from page 10*

4	1	5	6	3	2
6	3	1	2	5	4
1	4	2	3	6	5
2	5	3	4	1	6
5	2	6	1	4	3
3	6	4	5	2	1

**Solution to Senior House**  
*from page 10*

3	1	6	4	2	5
4	2	1	5	3	6
2	6	5	3	1	4
6	4	3	1	5	2
5	3	2	6	4	1
1	5	4	2	6	3

**Solution to New House**  
*from page 10*

2	1	9	7	8	6	5	4	3
7	8	3	5	2	4	9	6	1
4	5	6	1	9	3	8	7	2
5	3	2	6	7	1	4	8	9
1	4	7	8	3	9	2	5	6
6	9	8	4	5	2	3	1	7
8	2	1	3	4	7	6	9	5
9	6	5	2	1	8	7	3	4
3	7	4	9	6	5	1	2	8

**Solution to Who’s Next?**  
*from page 10*

5	2	8	1	4	3	6	9	7
7	3	6	9	8	5	4	2	1
1	9	4	6	2	7	5	8	3
4	6	2	3	7	9	8	1	5
3	5	1	8	6	2	7	4	9
9	8	7	5	1	4	2	3	6
6	7	9	4	3	8	1	5	2
8	1	5	2	9	6	3	7	4
2	4	3	7	5	1	9	6	8



# Monetary incentives skew Career Fair towards Course 6

**By Sophia Liu**  
GUEST COLUMNIST

This document, led by Innovation Committee members Shirin Shivaie ('17) and Tiffany Yeh ('17), reports a few concerning items indicating that the underrepresentation of groups in planning yields negative effects. Shivaie and Yeh recount that attempts to collaborate were unwelcome. The partners initially denied the UA's request to have access to planning documents. After agreeing to send bi-weekly updates at the beginning of the summer, this communi-

The profit structure of CF raises serious questions and concerns over the unequal distribution of funds on our campus. How do we tell students that there isn't enough money for professional development on campus when SWE is receiving a budget that is over ten times the size of Graduate Women at MIT's budget? Why are other undergraduate professional development groups, such as the Society of Hispanic Professional Engineers or the National Society of Black Engineers, not only prohibited from planning career fairs in the fall because of this agreement but also subjected to significantly smaller budgets for professional development? If we are only allowing one career fair in the Fall for the purpose of optimizing employer interactions (many companies can only send recruiters once a year, and having many career fairs would make it more difficult for students), shouldn't the organizations in charge of advising career fair take a more proactive role, be most representative of all students, and

*Sophia Liu 2017 is a former UA President.*

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# Response to 'Health insurance for graduate students with dependents to increase'

**By Cecilia Warpinski Stuopis**

LETTER WRITER

On behalf of MIT Medical and the Office of the Dean for Graduate Education (ODGE), we are writing to express our disappointment in your front-page story “Health insurance for graduate students with dependents to increase” in the May 11 issue of The Tech. To our knowledge, no one from The Tech took the time to contact our offices for comment or to check facts. The resulting story falsely implied that the MIT administration and MIT Student Health Plan had discriminated against MIT families. This caused concern in the graduate student community.

The truth is that MIT has kept rates for family coverage artificially low for many years. In 2006, it cost \$1,560 to add a spouse to the Extended Plan. Last year, the cost was \$1,536. During those same 10 years, government data shows that individual healthcare premiums rose 52 percent, while, according to the Kai-

ser Family Foundation, the average premium cost for families rose 58 percent.

## How did MIT manage to do this?

By 2006, the Student Extended Insurance Plan had accumulated a large reserve of health plan funds. The Institute decided to draw from this surplus to subsidize health insurance premiums for families. However, these reserves were depleted over time, particularly during the past several years, when premiums fell far short of covering the costs of the services that the Student Extended Insurance Plan covers—hence, the need to increase spouse and dependent premiums for next year.

Although the total cost to add a spouse to comprehensive student insurance (basic coverage + Extended Plan) will rise by 9 percent for the 2017–18 academic year, from \$2,976 to \$3,252, MIT families will continue to pay significantly less for comparable coverage than families at our peer institutions. Adding a spouse to student coverage at other

New England universities, such as Harvard or Dartmouth, next year would cost \$6,776 and \$5,410 respectively. Additionally, MIT charges the same rate for dependents regardless of the number of children covered by the plan. Many of our peer institutions charge an additional fee for each child.

Finally, let us correct one additional misconception from your article—the implication that insurance costs for MIT faculty and staff are lower than those for students. The faculty and staff health plan differs in many ways from the student health plan, so it cannot be an “apples to apples” comparison. However, fact-checking the published rates on [medical.mit.edu](http://medical.mit.edu) and [hrweb.mit.edu/benefits/](http://hrweb.mit.edu/benefits/) would have shown that the family plan for students cost 12.7 percent less than the family plan for employees last year. Next year’s increase in student premiums makes costs for student families roughly equivalent to the premiums employee families pay for their least expensive MIT insurance option;

the family rate for the more expensive employee plan is significantly higher than for the student plan.

Healthcare and health insurance are emotionally charged topics. We see evidence of this every day as Congress debates the future of the Affordable Care Act. And because healthcare is such a sensitive subject, it is important that reporting on the topic is accurate and fair.

If members of the MIT community still have questions or concerns, please email [medical@mit.edu](mailto:medical@mit.edu). We know that any increase in health care costs can be challenging for students and families, and MIT Medical and ODGE are available to work with interested or concerned community members on this issue.

Sincerely,

Cecilia Stuopis, Medical Director, MIT Medical

Blanche Staton, Interim Dean for Graduate Education

## GUEST COLUMN

# An excerpt from a student's reflection on the technical education

*'We are unknown to ourselves, we men of knowledge: and with good reason. We have never sought ourselves,—how could it happen that we should ever find ourselves?' ~Friedrich Nietzsche*

**By Christopher Sanfilippo**

*GUEST WRITER*

In February, I attended a discussion with Chancellor Barnhart regarding the future of the MIT education. Our guiding questions: What bold experiments in education should MIT pursue? What should a college education entail? I was prompted by the discussion to reflect on the character of the education I have received. Intent on understanding the most fundamental aspects of nature, I came to MIT seeking an education in physics. I will certainly leave knowing much more physics than when I arrived. However, I have received, or more accurately, stumbled into a second education—one that I did not seek because I was not aware I needed it. I now believe this second education, which I will call my “human education,” is significantly more important than my technical one; and moreover, that it has benefited me in a deeper and more serious way. My motive for writing, then, is to clarify what I mean by this human education and to explain why it is particularly needful at MIT. I hope my peculiar experience may help others address the questions Chancellor Barnhart posed.

What exactly do I mean by a “human education”? An inquiry, I think, is best characterized by its guiding question, by what it seeks to know. Above all, this education focuses on the question: *What is the good life for human beings?* It asks, what kind of life best addresses our true needs? And it seeks to understand those needs by investigating our true opinions and concerns. There are two principal differences between a human and technical education that are worth elaborating here.

A human education is not obviously objective in the same way a technical education seems to be. The inquiry into human questions is not, and cannot be, objective because we cannot approach these questions in a disinterested manner. We, as human beings, necessarily live in light of *answers* to the big questions. We could not function if we truly believed we did not know, for example, what would make us happy, or what the right thing to do was. Wrapped up in every important decision we make are opinions about human happiness, about right and wrong, and about what it means to be an impressive and admirable human being. In short, we live according to certain moral and political opinions. Because

we have lived our lives up to this point on the basis of these opinions, it is exceedingly difficult to question them. Our opinions get buried deep within our souls. On the basis of my own experience and observations, I assert: Our situation as students is such that we are ignorant of ourselves. We do not really attempt to articulate our opinions nor are we certain that they are coherent or consistent. Thus, a true human inquiry must be self-reflective. We must look inward. If we were to take a human education seriously, we would begin from our ordinary moral and political opinions because we fear holding unexamined, and therefore potentially confused, opinions. To quote the famous 20th century political thinker Isaiah Berlin: "To neglect the field of political thought, because its unstable subject-matter, with its blurred edges, is not to be caught by fixed concepts, abstract models, and fine instruments...is merely to allow oneself to remain at the mercy of primitive and uncriticized political beliefs." To put it bluntly: the risk of neglecting the political is enslavement to unexamined opinion.

An analysis of this sort—which claims that we are ignorant of ourselves, and worse, not even aware of our own ignorance—cannot in itself be persuasive. If I had read the above paragraph when I was in high school I probably would have laughed. It is difficult to take seriously the possibility of one's own ignorance. I can speak only to my own experience: I have first-hand knowledge of how terrifyingly easy it is to hold wildly contradictory opinions, defend them vehemently, and act in a way that is completely contradictory to what one claims to believe in speech. But I have come to believe that our self-ignorance is not final—that there is a way to rectify our sorry state: the human education, which focuses not on the external, but on one's own soul.

The second difference between the human and the technical education is that the two are concerned with different kinds of questions. Scientific or technological questions—the kind MIT students are used to—are questions of means, whereas the moral and political questions are questions of ends.

We all say that science is morally neutral, that it deals with facts and not values. We say science does not address questions like, "Should I build a nuclear bomb for Hitler?" (a question the German physicist Werner Heisenberg and his colleagues faced during World War II). One need look no further than

the Farm Hall Transcripts to see that not all intelligent people hold the same values or believe in the same ends. I do not believe I am saying anything controversial when I say science is inadequate to direct human beings. It can take us to the moon, but it cannot tell us why we should want to go there. To borrow a metaphor: our scientific conquest of nature has made us giants with respect to man of previous ages, but we have given up on the pursuit of knowledge of ends. Thus, we are blind giants. But the giant, *precisely because of his power*, is most in need of knowledge of ends.

What knowledge can direct the blind giant? I sympathize with the student who is inclined to say it is not possible to have any true knowledge of ends. We, MIT students, are predisposed to give up on the possibility of knowing ends in part because we believe that what is knowable in the definitive or authoritative sense is what can be subjected to rigorous scientific analysis. It is certainly not obvious that there is a science of values, i.e., that we can scientifically demonstrate the goodness of certain ends. Why should we think any other way? Modern natural science seems to have set an untouchable standard of truth. As Neil deGrasse Tyson asserts, "After the laws of physics, everything else is opinion." But we would not be honest with ourselves if we claimed we did not believe in ends or that it is not at all possible to rank the various ends of human life.

Our anger has a way of revealing our true opinions. At least for myself, the first fruits of my education were realizing that I was strongly attached to certain ends and that I demanded others hold the same ends as I did. My indignation at what I perceived to be injustice was the most important evidence. But anger is problematic in that it is an implicit claim to know. When we are angry, we do not doubt ourselves but are certain that we are in the right. My education has showed me that I was not, and am still not, clear about precisely what justice is. In general, a great benefit of the human education is that it can temper our zeal by revealing our ignorance to ourselves. This is not to deny anger can be a powerful political tool; however, it can also be a dangerous one. Anger gave us Trump. It seems to me it is more appropriate for us as students to approach human questions in a moderate way, not believing we know the answers before we have even understood the problems.

If MIT is going to be more than an extravagant and expensive vocational school, if the education it provides is going to be more than information transfer, then it should do what it can to promote this kind of human education: an education that is self-reflective, concerned with the fundamental *human* questions.

At a place like MIT, it is very difficult to put these questions at the heart of one's education. I was fortunate to spend my freshman year in Concourse, the somewhat obscure freshman learning community, where this kind of education is alive and flourishing. It is dedicated to an education of the whole human being. Nearly every important thing I learned at MIT, I learned in Concourse, not only in the classroom, but in conversations with professors and classmates, and at all hours. In Concourse, I came to understand that part of what it means to be educated is to see clearly what one believes and to scrutinize those beliefs by considering serious alternatives. We cannot be open to alternatives if we never acknowledge that we might be wrong. I can say with certainty that all students who go through Concourse and take it seriously have their opinions challenged. They come out the other side improved as human beings. Some opinions are pruned away, and some are left unchanged. But in either case we leave Concourse better equipped to defend what we believe, to understand the limits of what we know, and most importantly, to get the most out of our other classes.

MIT as an institution should encourage students to seek out those courses and professors that can bring to life these fundamental human questions. As I said, I stumbled into my education. But I am so grateful I did. The four years of undergraduate education are uniquely suited to this kind of open and honest inquiry. There is no other moment in our lives where we have the security and freedom that allow us the time to live with the uncertainty about the big questions. As soon as we graduate, we are rushed back into the world and forced to depend on the answers we have formed. MIT need not undertake bold experiments to improve its education—what we as students need most is a human education.

*Christopher Sanfilippo is a member of the MIT Class of 2017.*

—Will Jack '17, Sasha Rickard '18, Ian MacFarlane '18, and Mary Jane Porzenheim '19 are also signatories.

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## TECH TRANSFERS

## Nir Shavit

Immigrant members of the MIT community

America is now my home, but unlike many people who “immigrate” and then go through the process of building a life in their new country, I gradually built a life to the point where I can now say that I have indeed “immigrated.”

I was born in Israel to academic parents, and at age six, I moved with them to L.A. I remember my first moments in the US: the big sun rising at the end of a wide avenue, the endless food shelves in the super market, the Gemini spacecraft docking in space on TV, and the absolutely enormous size of the cars.

I returned to the US at age 15 for one year to get a taste of 31 flavors, ice-skating, and high school graduation. America was enchanting, but I left it eagerly to go back to Israel, the army, and university. At age 24, I came to intern in LA for a summer and discovered a new America, an America seen through an adult’s eyes.

At age 27, I met an American girl (surprised?) and followed her to live in Cambridge. A couple of years later, I went to postdoc at Stanford and then at MIT, but

then took the girl and moved back to Israel, where I started my academic career at Tel-Aviv University.

But my wife loved America, and so we compromised, spending the next 20 years moving back and forth every few years, maintaining homes and academic careers in both countries. Gradually, as with anything you invest time in, America became familiar, and I fell in love with it: with the streets, the coffee shops, the snow and the rain and the Charles on a sunny day. I raised my children here and grew to see America through their eyes: a large, hugging land of opportunity where most of the time you have no idea how to correctly pronounce a person’s name.

In 2011, I joined MIT and found a thrilling academic home. I had, in all aspects of my life, finally immigrated.

*Nir Shavit is a Professor in the Department of Electrical Engineering and Computer Science.*

*Editor’s note: Tech Transfers is a photo series by Professor Daniel Jackson that features immigrant members of MIT.*



PHOTO COURTESY OF DANIEL JACKSON

**Nir Shavit**, Professor in the Department of Electrical Engineering and Computer Science.

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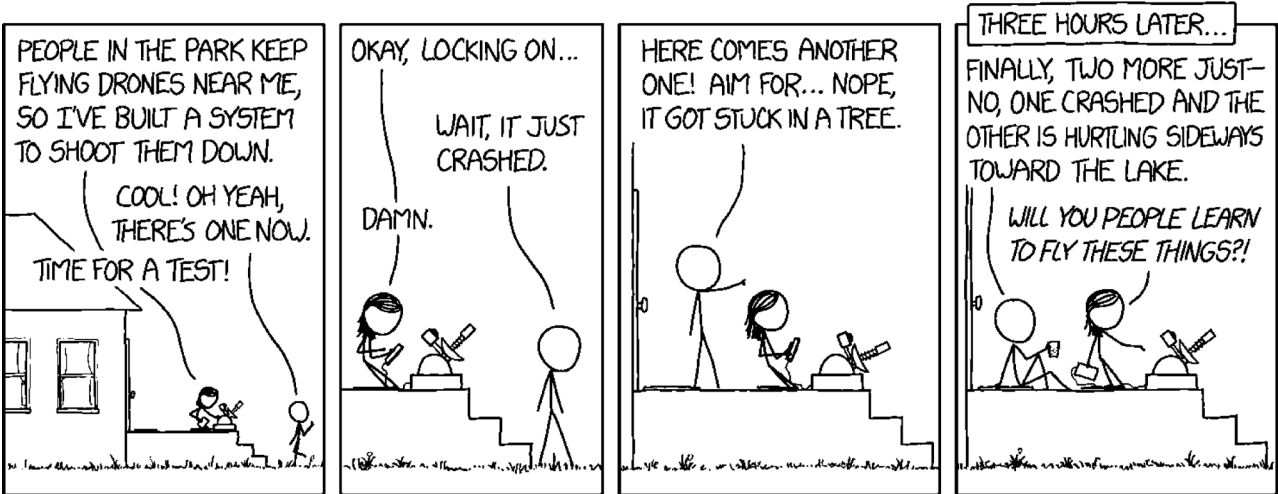
# Commencement

Solution, page 3

6x	20x		26+			315x		
	144x				15x		12+	
21x			36x	8		5-		4
	14+			27x			280x	
9+	2		90x		30+			
	12x			4x			2-	
336x					14+			9
162x		20+				24x		3
	336x			3-				1

Instructions: Fill in the grid so that each column and row contains exactly one of each of the numbers 1–6. Follow the mathematical operations for each box.

## [1846] Drone Problem



On the other hand, as far as they know, my system is working perfectly.



## Hold 'Em by Billy Truitt

Solution, page 3

## ACROSS

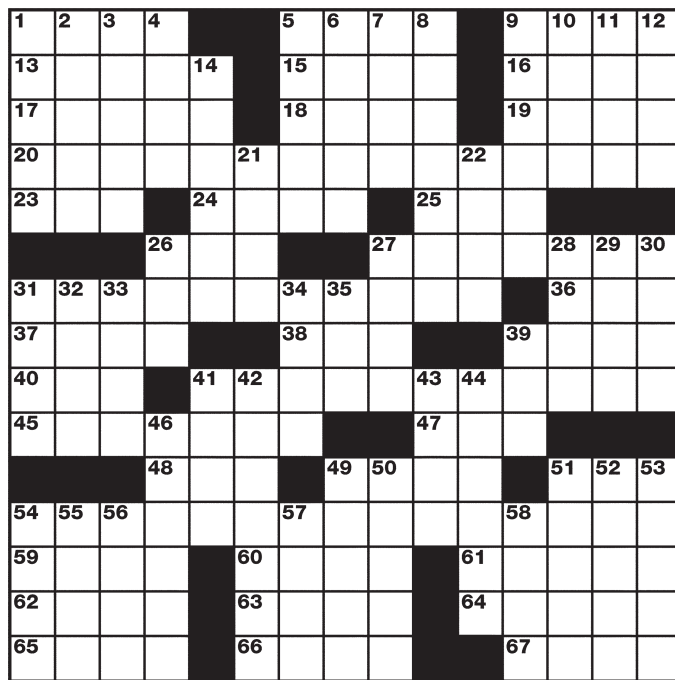
- 1 Stigma
- 5 Burns, for one
- 9 Firewood order
- 13 Bedroom community
- 15 Luau figurine
- 16 Moisturizer ingredient
- 17 \_\_ Soleil (Louis XIV)
- 18 Teen's big event
- 19 Other glove
- 20 Casino patron
- 23 Gestural communication:  
Abbr.
- 24 Scintilla
- 25 What a flat needs
- 26 Wheel of Fortune buy
- 27 Stoic
- 31 Windjammer or clipper
- 36 Time to remember
- 37 Off-target, in a way
- 38 Harry's Hogwarts chum
- 39 Trident-shaped letters
- 40 Ruckus
- 41 Rolex Submariner, e.g.
- 45 Hokum

47 Be indisposed  
48 To be refined  
49 Ruckus  
51 Penlight battery  
54 Theme of the puzzle  
59 Cry of fright  
60 Marge's eldest  
61 Bask in  
62 Rise up  
63 Treater's term  
64 Something boring  
65 Small vortex  
66 Academic period  
67 Babysitter, at times

**DOWN**

- 1 \_\_ sauce (raspberry topping)
- 2 Rink leaps
- 3 Bucolic
- 4 Keaton, in *The Founder*
- 5 March honoree, familiarly
- 6 About
- 7 "Enough, I get it!"
- 8 Back-of-orchestra  
instruments

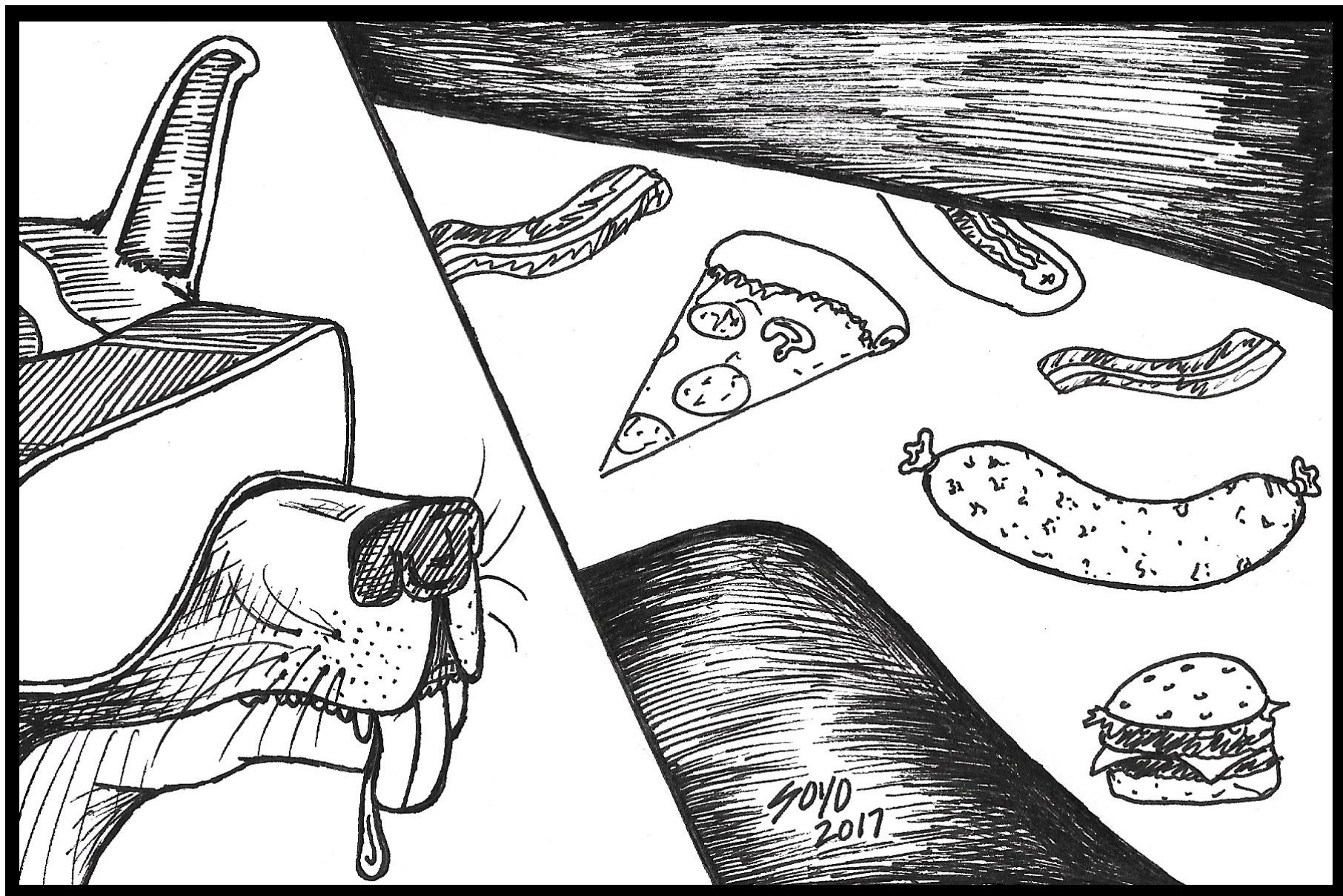
- 9 Sporty Chevy
- 10 "DNA or \_\_\_?" (cosmetics slogan)
- 11 Mechanical learning
- 12 Does and bucks
- 14 Suit since the '40s
- 21 Fall in with
- 22 Far from crisp
- 26 Robin Hood refreshment
- 27 Hesitant denial
- 28 Down garment, maybe
- 29 Kid lit author Carle
- 30 Bit of pepper
- 31 31 Across implement
- 32 Verdi masterwork
- 33 Fan favorite
- 34 Overcast
- 35 G, in the C scale
- 39 Sidekick
- 41 "Parties," to "pirates":  
Abbr.
- 42 Early job for Walt Disney
- 43 Deep cut
- 44 Birthday party rituals
- 46 Mean-spirited



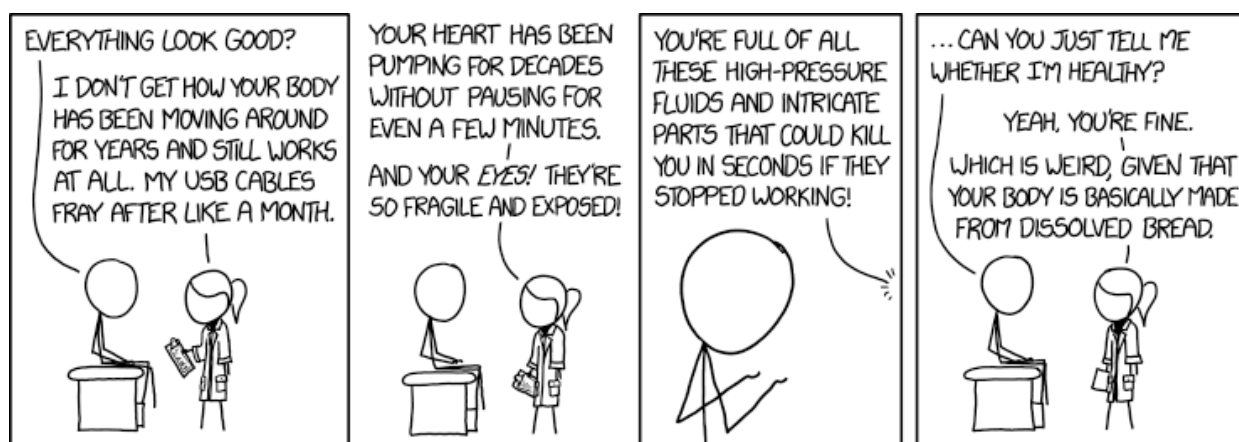
49 Terra \_\_  
50 Unmitigated  
51 Green pear  
52 Accessorize  
53 To this point

54 Car-boot item  
55 Made haste  
56 Galaxy Tab alternative  
57 Lose power  
58 Tolstoy heroine

# Canine Virtual Reality



## [1839] Doctor Visit



According to these blood tests, you're like 30% cereal.



## Solution, page 3

12x		6x	120x	
	12x		1-	6
2		5		8x
13+				1-
9+		12x		1
	40x			2÷

Instructions: Fill in the grid so that each column and row contains exactly one of each of the numbers 1–6. Follow the mathematical operations for each box.

Solution, page 3

5				4			9	
7	3		9					
		4		2		5	8	3
			3				1	
3		1				7		9
	8				4			
6	7	9		3		1		
					6		7	4
	4			5				8

Instructions: Fill in the grid so that each column, row, and 3 by 3 grid contains exactly one of each of the digits 1 through 9.

EVERYONE LOVES THOSE EAGLES THAT TAKE DOWN DRONES, BUT... I DUNNO.

YOU GOTTA ADMIT, IT'S PRETTY COOL.

YEAH, BUT... TRAINING RARE ANIMALS TO HURL THEMSELVES INTO WHIRLING MACHINERY CAN ONLY GET US SO FAR, YOU KNOW?

AT SOME POINT IT'S LIKE RELEASING POLICE DOGS ONTO FREEWAYS TO ATTACK SPEEDING MOTORCYCLES.

ALSO COOL, BUT I SEE YOUR POINT.

PLUS, I JUST FINISHED MY AUTONOMOUS DRONE THAT HUNTS EAGLES.

MAN, YOU ARE AN ENTIRELY SEPARATE CLASS OF PROBLEM.

It's cool, it's totally ethical—they're all programmed to hunt whichever bird of prey is most numerous at the moment, so they leave the endangered ones alone until near the end.





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SPORTS BLITZ

**Men's Baseball (21-14-1)** made their fourth appearance in five years at the NEWMAC Championship but fell in back-to-back games to Babson College. Three were named to the 2017 Academic All-America Division III Baseball Team, including Austin Filiere '18,

who extended his on-base streak to 64 games, a NEWMAC record.

**Men's Lacrosse (10-6)** were the victim of seven consecutive goals as they fell in the NEWMAC Semifinals to Clark University.

**Men's Tennis (18-5)** had six members named to the NEWMAC All-Conference Team. Tyler

Barr '19 because the first Engineer to make it to the Division III Single Championship Tournament in 5 years, finishing with a team-leading 17-6 record in the spring.

**Women's Basketball (20-6)** fell in a close one to Smith College in the quarterfinals of the NEWMAC Tournament. Liana Ilutzi

'17 was selected to appear in the NEWBA Senior Classic. Ilutzi is ranked second all-time in Engineer history in assists.

**Women's Field Hockey (13-5)** battled in the NEWMAC Tournament Championship where they gave up the only goal of the game. Additionally, twelve Engineers

earned places on the National Academic Squad.

**Women's Volleyball (21-5)** took home their fifth NEWMAC Tournament Championship, then fell to Springfield in the second round of the NCAA Tournament. Three Engineers were named to the All-New England Team.

Special thanks and best wishes to the Class of 2017 student workers

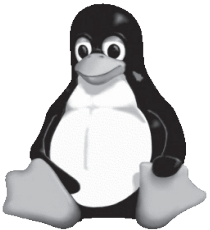
Kaylee Brent  
Casie Chen  
Dan Chen  
Lilly Chin  
Noelle Colant  
Christopher Desnoyers

Maria Escobar  
Wendy Georgan  
Matthew Hodel  
Ellen Popova  
Rose Robb  
Lauren Rotkovitz

Priyanka Satpute  
Riddhi Shah  
Amelia Smith  
Daphne Superville  
Mrudul Thatte  
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